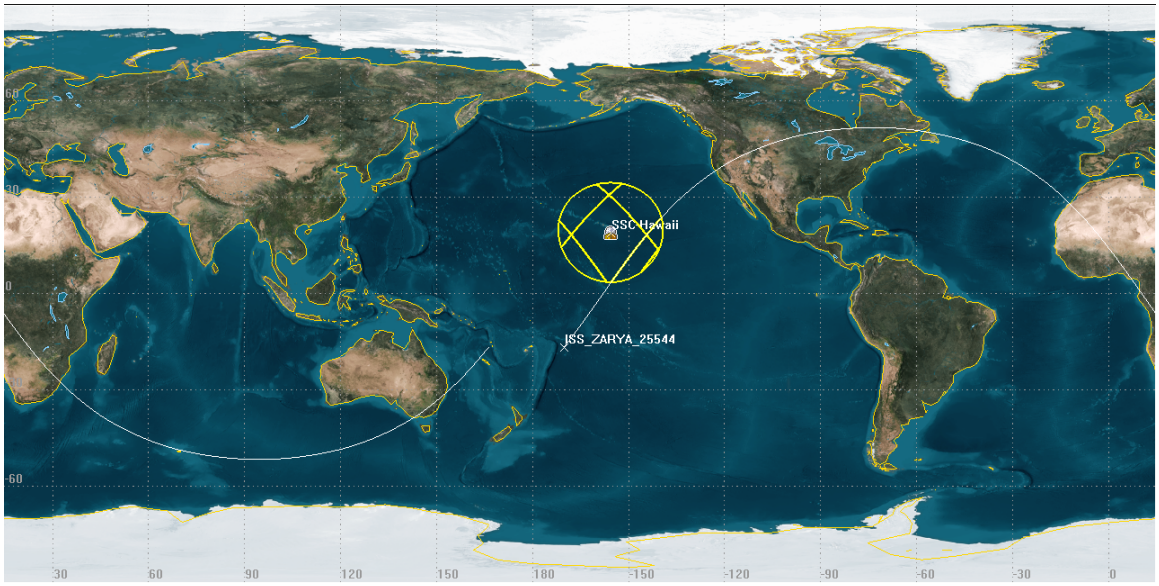
Mission support of Altair Pathfinder from USN's Hawaii ground station

Altair pathfinder was created to demonstrate next-generation hardware and software technologies to realize new mission capabilities previously thwarted by excessive cost, schedule and/or technology unavailability. The spacecraft was constructed and will be operated by Millennium-Space of California. The spacecraft will be launched on the ISS resupply mission on March 19th and subsequently ejected by the "NanoRacks" mechanism from the ISS on April 24th 2017 at 21:48:00 UTC. This date and time are subject to update due to ISS scheduling. USN has been contracted to support the mission early mission, and potential subsequent extension.

The spacecraft is nominally in the ISS orbit separated by a delta-V. This orbit allows USN's Hawaii ground station to have visibility 4 times each day.



First day of support when ejected from the ISS coverage in Hawaii

Altair ISS ejection and coverage of first day

The Altair spacecraft will be ejected from the ISS using the NanoRacks mechanism along with various other small spacecraft with varying delta-V's. The analysis below uses the ISS orbit for the first day as the spacecraft will essentially be following the ISS with only a small separation. This analysis will be updated when the schedule and time of ejection are finalized pending ISS scheduling before ejection, as the exact day and time are subject to change.

	Downlink	Uplink
Altair Pathfinder	2250.180 MHz	2072.011 MHz

ISS (ZARYA)
1 25544U 98067A 17046.51674720 .00002527 00000-0 45049-4 0 9992
2 25544 51.6442 284.8397 0007107 191.9940 240.2193 15.54369543 42836

Passes visible from USN-Hawaii for first day of support

Access	Start Time (UTCG)	Stop Time (UTCG)
1	25 Apr 2017 02:51:05	25 Apr 2017 02:59:06
2	25 Apr 2017 04:29:36	25 Apr 2017 04:32:47
3	25 Apr 2017 16:10:12	25 Apr 2017 16:16:22
4	25 Apr 2017 17:45:51	25 Apr 2017 17:53:09

Flux Density impinging on the ground in Hawaii from Galileo FOC10 and FOC11

The Flux density is calculated as:

$$\boldsymbol{Flux\ density = EIRP \div (4\pi\, Rse^2)}$$

Where $\boldsymbol{Rse}$ is the distance from spacecraft to the ground?
Where $\boldsymbol{EIRP}$ is the Effective Isotropic Radiated Power of the spacecraft?

Data from the spacecraft vendor indicates that the nominal EIRP of the Altair Pathfinder spacecraft is -5.37 dBW. Being a near circular orbit, the altitude (and thus the closest distance to earth during an overhead pass) is = 400 Km.

Converting -5.37 dBW to scalar watts = 0.290 watts transmitted at 2250.180 MHz

Therefor:

$$\boldsymbol{Flux\ density = 0.290 \div (4\pi * 400{,}000\ meters^2)}$$

Flux density = 1.442 x 10^{-13} Watts/meter^2
Or
Flux density = 1.442 x 10^{-14} mW/cm^2